

AbstractID: 14324 Title: Using V/Q SPECT-CT to Classify Anatomic Normal Lung for Individualized Radiation Treatments of Primary Lung Tumors

Purpose: The use of functional lung imaging (primarily perfusion SPECT) for use in radiation treatment planning becomes more complicated for patients with primary lung tumors, as reduction of dose to regions of non-tumor lung with higher signal intensity alone may not fully satisfy treatment intent. We investigated segregation of lung into regions for: dose avoidance, for potential dose delivery; and thirdly, for further assessment and plan adaptation.

Materials and methods: This prospective study comprised patients (51) with stages I-III NSCLC treated with conventionally fractionated conformal 3DRT to more than 60Gy, ±chemotherapy based on stage of disease. The co-registered CT data from V/Q SPECT-CT performed pre-, during, and at 3 months post-RT permitted analyses of corresponding SPECT scans with respect to each other and doses received.

Results: The combined analyses (deltaV, deltaQ, dose/time) permits classification of local lung regions according to underlying etiology and each region's potential application in guiding RT as follows: "Good lung" = lung with normal function to which the RT dose should be minimized to decrease dose dependent loss of function; "Bad lung" = lung with complete (or reduced) functional defect induced by COPD or other unrecoverable diseases which can be given high dose without causing change (or remarkable change, if no worse lung available) in global lung function; "lung for further study" = lung with temporary dysfunction induced by tumor and other potentially recoverable diseases which could be reclassified as "good" if function improves during treatment, or "bad" if it does not.

Conclusions: Combined V/Q SPECT-CT can be helpful for understanding the underlying etiology of lung function. Regions of lung can be classified and, together with dose response data, used to optimize RT plans to maximize tumor dose while minimizing potential loss of global lung function.

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